COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 91.

CANNING OF FRUITS AND VEGETABLES

By PROF. GEORGE C. BUTZ.

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COMMONWEALTH OF PENNSYLVANIA.

Department of Agriculture.

Harrisburg, Pa., March 25, 1902.

The following Bulletin No. 91, upon the Canning of Fruits and Vegetables, by Prof. George C. Butz, of the Pennsylvania State College, has been prepared at the instance of this Department, with the view of placing within reach of the farming people of this State, accurate information upon the modern methods employed by the canning factories, in the preservation of fruits and vegetables, for human consumption.

The experience of localities, in which these factories have been in operation, is such as to demand the careful attention of the farming people of Pennsylvania, who are desirous of finding a market for their more perishable products.

A personal investigation, made in 1899 by the Secretary of this Department, revealed the fact, that a single preserving establishment, purchased all of the sweet corn grown upon 575 acres; 375 acres of peas, 125 acres of string beans, 50 acres of lima beans, 350 acres of squash, 75 acres of pumpkins, 12 acres of rhubarb, 35,000 bushels of apples, 7,000 bushels of pears, 10,000 bushels of plums, 1,500 bushels of quinces, 300,000 quarts of raspberries, 50,000 quarts of strawberries, 50,000 quarts of blackberries; the number of bushels of peaches and apricots could not be given at the time the inquiry was made. About fifty tons of cherries were also canned. There were also gooseberries, blueberries, crabapples and currants put up in large quantities.

These figures show how valuable such an establishment can be in a community; and this bulletin, which has been prepared by Prof. Butz with great care, and after extensive investigation, is well worthy the serious consideration of farming people in this State.

JOHN HAMILTON,
Secretary of Agriculture.

LETTER OF TRANSMITTAL.

State College, Pa., February 20, 1902.

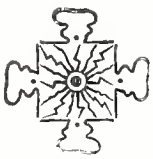
Hon. John Hamilton, *Secretary of Agriculture:*

Sir: I have the honor to transmit herewith a report upon the investigation of the growing industry in the canning of fruits and vegetables. Pennsylvania is far behind her neighboring States in the business of preserving these crops, but there is no inherent reason why our State should not be more extensively engaged in the production of canned goods. Fruit is grown extensively, and much of it could not find a better market than is afforded by canning factories near at hand. Vegetables grown upon truck farms are produced at much less cost than upon the garden plots of high priced land, and farmers realize a greater profit in growing vegetables for canning factories than in growing the usual farm crops. This report is prepared with a view to furnishing information upon the prevailing methods in canning fruits and vegetables, the construction of factories, and the remarkable machinery which modern experience has brought forth.

Many of the special preparations placed upon the market by certain packers, are not treated in this connection because they are proprietary articles, virtually, and their methods of preparation are not to be disclosed.

Very respectfully,

GEO. C. BUTZ.



CANNING OF FRUITS AND VEGETABLES.

THE CANNING INDUSTRY.

The enormous quantity of canned goods that is annually put up by American factories is astounding, to say the least, and when considered commercially, is well worthy the distinction of an industry. The pioneers in the business may have hesitated to invest largely in this stock, but it is certain now that the canning industry is on as permanent a basis as is the iron or coal industry. The successful preserving of fruits and vegetables in tin wrappers in quantities to supply the world and for a price that will carry the goods into the humblest home, has been demonstrated by the experience of more than a quarter of a century. The demand for canned goods steadily increases from year to year, and it may be said even now that a large part of our population is wholly depending upon the canner for the fruit and vegetable part of their diet. This is true not only of the millions who dwell in tenements and other thickly populated portions of our cities, but also of other millions who formerly grew their fruits and vegetables in private gardens and abandoned them in favor of the canned articles which may be had at a less cost and with less labor.

A steady increase in population requiring increased quantities of foods, the introduction of special machinery to economize labor and cheapen production, and the tendency of men to engage in special and limited lines of work, force us to admit our mutual dependence for the products of each others labors. And so the canning industry has attracted to itself the men who are specially qualified to prepare and preserve certain foods which could not be enjoyed by millions of their fellowmen, except for this art of canning. The demand for canned goods will continue to grow and it is next to impossible to estimate the probable development of the next quarter of a century. The growth of the business done in the past decade is a pretty fair index of what may be expected in the future. In the reports published by the *American Grocer*, the total packs in America of tomatoes and corn for the past ten years are expressed in figures as follows:

TOMATOES.

Year.	Total pack cases of 2 dozen tins each.	Lowest price per dozen.	Highest price per dozen.
1890,	3,166,177	.77½	$1.00
1891,	3,405,365	.80	.85
1892,	3,366,792	.82½	1.00
1893,	4,635,183	.95	1.45
1894,	6,586,979	.70	1.10
1895,	4,194,780	.60	.75
1896,	3,541,188	.57½	.80
1897,	4,194,780	.60	1.00
1898,	5,797,806	.80	1.15
1899,	7,404,923	.70	.85
1900,	5,849,593	.65	.80

CORN.

Year.	Total pack cases of 2 dozen tins each.	Lowest price per dozen.	Highest price per dozen.
1890,	1,588,860	.60	$1.10
1891,	2,889,153	.95	1.20
1892,	3,351,079	.95	1.25
1893,	4,301,451	.80	1.10
1894,	3,414,808	.65	.85
1895,	3,121,164	.55	.75
1896,	2,676,515	.50	.75
1897,	2,908,740	.50	.85
1898,	4,448,563	.60	.75
1899,	5,440,920	.62½	.80
1900,	6,485,624	.62½	.80

The permanence of a business dealing with such quantities cannot be questioned. It may be remarked also that the total output of the canning factories of this country in vegetables and fruits is practically all consumed within our own boundaries. The foreign shipments have been small, simply because the home consumption has held all the goods in this country. *The Trade*, of Baltimore, a journal for canners and grocers, in a weekly review of September, 1901, says:

"Meat has for many years been one of the steady articles of supply which the new world has sent to the old. Fish in the form of salmon and sardines, to say nothing of oysters and barreled fish, have furnished vast amounts of exports to foreign people, and it is as certain as the rising and setting of the sun that canned goods will yet form a vast amount of exports from America to Europe. If Europe, however, counts upon America for any exports of canned vegetables and fruits this year, she will have to be prepared to compete with our home consumers for what she gets. There will be no surplus of anything this year for exports."

It is difficult to obtain statistics of the latest pack because the packers are not inclined to tell their output for fear of influencing the market against them.

THE HISTORY OF THE DEVELOPMENT OF CANNING VEGETABLE PRODUCTS.

When we look for the beginning of canning fruits and vegetables, we find the credit and honor of the discovery is accorded to a Frenchman named Appert, who in 1810 published under the authority of the French government the results of his experiments in preserving fruits in air-tight packages after boiling. As early as 1819, Thos. Kensett, who probably learned the art before leaving England, is known to have put up canned goods in New York in partnership with Ezra Daggett. This firm obtained a patent in 1825 for an improved method in the art of preserving, from the United States government. During the subsequent fifteen years other attempts at preserving fruits, vegetables and fish were made in several quarters along the eastern coast, but they were not all successful. Isaac Winslow, of Portland, Maine, began his experiments in canning sweet corn in 1839; at first he boiled the whole ears without satisfactory results. He then cut the corn from the cob before boiling, but was disappointed to find, later, that nearly every can swelled. He persisted, however, in his effort to find the error of his ways and after many years of failure and partial successes he perfected his methods and

secured a patent for it from the United States in 1862, several years after the application had been made. Isaac Winslow was the first to pack sweet corn in cans for sale. In 1847 the first tomatoes were packed for sale. This was in New Jersey. It was not long before small canning factories were established in several States east and west, but many reverses were met with from time to time to discourage very extensive packing. As late as 1878, the corn packers of Maine lost their entire output by having it spoil, for a reason which they could not then discover. E. D. Duckwall referring to this event in his "Bacteriology" of canning in 1899 says: "The few manufacturers in Maine at that time suddenly had a very rough experience in 1878, when the entire output spoiled, nor were they ever afterwards able to sterilize their cans by the boiling process. Capital had been invested, and the business had been growing rapidly before, and now every thing seemed to be lost. New locations were tried, longer times of boiling were given, but without avail; the corn seemed to have changed into a new product which would not keep. Some manufacturers sent samples to chemists for analysis to find out what caused the trouble, but the real cause not being known they could not give the manufacturers any information of practical value, except that the spoiled corn contained small round globules which were not dissolved by boiling heat." Such experiences kept canners shy of making heavy investments until a closer study of the difficulties brought about such modification of the processing of corn that "swells" became infrequent and are now reduced to a very small fraction of the pack.

Twenty-five years ago the demand for canned goods became brisk and factories were springing up in many of the States, prominently in Maine, New York, New Jersey and Maryland, the last named being a strong leader in the industry for several years. In 1890, it is reported that 20,000 factories were in operation in the United States, and it is very probable that the late census will show that the number has more than doubled with greatly increased facilities.

CO-OPERATIVE CANNERIES.

In recent years, agents of canning machinery manufacturers have visited rural communities to induce farmers to organize themselves into companies to grow vegetables and erect a canning factory to pack the crops. All encouraging information was freely given and the so-called "secrets" of canning were promised in the event of organization. The agent was interested only to the extent of making a sale of the factory outfit for which, often, an exorbitant price

was charged. It stands to the credit of the farmers, however, that but few such factories were established, probably the sad experiences of the co-operative creameries restrained them from venturing upon anything that had the word "co-operative" attached to it.

INDIVIDUAL MANAGEMENT.

The nature of canned goods is such that the management of the business of the factory is most successfully conducted when it is reposed in one responsible head. The person chosen may represent a company, but he should be possessed of such business traits that all confidence may be placed in his ability to buy materials and sell goods. He must have in his employment a "processor" whose experience will bespeak a successful pack. Such men are paid from $50 to $150 per month, according to their qualifications. The work of the processor requires the greatest amount of skill, and while formerly a great degree of mystery was thrown about his work to guard the "secrets" of canning, it is now well known that there are no secrets, except where the use of preservatives forbidden by law is practiced. Canners have learned that it is better for them to throw open their factories to visitors, permit the closest inspection of their operations and disclaim any secrets, and thus retain the confidence of the people in the cleanness, wholesomeness and purity of the foods they can. No person can steal a processor's skill by a visit to his factory; nor can one equal the capper's speed by watching him at his work.

Farmer's are benefited by having canning factories operating in their section of country, as they find it more profitable to grow tomatoes, corn or peas for the canner than by growing any other crop. The basis of calculation is upon present prices paid for raw materials. The yield of tomatoes varies greatly in different years and soils. It may be considered as coming somewhere between 8 and 16 tons per acre, a fair average yield being 12 tons or about 400 bushels. During the past season farmers contracted to supply tomatoes to the factory at $6 per ton, but owing to the unfavorable conditions existing in September, many canners were eager to get tomatoes at a much higher figure.

Corn does not figure so well. The yield from good land is about 4 tons per acre for which the canner pays about $6 per ton. Where corn is being extensively canned, as in New York and Maine, the farmers count it a little more profitable to grow sweet corn for the canner than to devote the same land to their usual crops.

Peas of the varieties grown for canning will yield 75 to 100 bushels per acre. Packers pay from 75 cents to $1.25 per bushel. The farmers of Delaware when peas are extensively canned, realize an average net profit of $20 per acre, after accounting for labor, seed and fertilizer.

LOCATION OF CANNING FACTORIES.

There are several important considerations that determine the proper location of a factory. While there are a number of large factories in the principal cities, the great majority of them are in the small towns scattered over the country districts. Here the canner is in close proximity to the vegetables or fruits which he calculates to pack, and he may have them delivered at his factory in the freshest possible condition. Too much stress cannot be laid upon this consideration, for the quality of canned goods depends largely upon the condition of the raw material at the time of canning. If fruits and vegetables must be bruised and heated by much handling and close packing for transportation, they cannot be expected to turn out of the cans with as fine an appearance and flavor as the goods that does not suffer such injury. The many establishments in the cities take advantage of the great surplus of vegetables and fruits that constantly pour into the markets and being perishable must be sold at any price.

If a locality possesses a soil and climate adapted to the growing of such vegetables and fruits that it is desired to possess, it is a simple matter to induce the farmers of the region to plant and grow them when a profitable market is in sight. The farmers of Pennsylvania have long felt that they must find a crop to take the place of so much wheat, which it is no longer profitable for them to grow. Wherever factories have been successfully conducted, the farmers have been pleased with their experience in growing and supplying the raw materials, and they have profited greatly by the changes brought about by the establishing of a canning factory. The two vegetables most extensively canned are tomatoes and sweet corn, and neither is very exacting as to the character of its soil, therefore, one needs not travel far to find a suitable locality for a factory so far as the soil is concerned.

Transportation Facilities.—The facilities for carrying goods to the centres of trade have much to do with the success of a canning business. Therefore it is desirable to choose a location with railroad and telegraph or telephone cummunications. Without railroads a canning factory cannot draw the raw materials more than a few miles and its possible output would be exceedingly limited, and the marketing of its goods very expensive. On the other hand, with railroad facilities the raw materials may be drawn from a much larger territory, and the cased goods can be placed in the markets at the least expense. If a private side track of railroad can be placed close to the factory, much time and labor may be economized in the loading and unloading of materials shipped and received. The ware-

room in which the cased goods is stored may also be conveniently located along the side track.

Water Supply.—An abundant supply of pure water is constantly needed during canning operations. Materials must be washed or scalded, utensils and machinery kept clean, and in the processing so much steam is used up that the boiler requires frequent replenishing with water.

Laborers.—It is also well to consider the matter of securing the necessary help to carry on the operations of canning to the fullest capacity of the factory. If the factory can be located where the community can supply sufficient hands, men and women, to successfully operateit the difficulties that attend the employment of non-residents will not be met with. The great bulk of canned fruits and vegetables is put up within three months and during that time the perishable goods are brought to the factories in immense quantities. At such a time a single day's idleness or insufficient help, will entail a great loss to the business. About 10 hands (unskilled), will be needed to run a factory of 2,000 cans per day capacity.

CAPITAL REQUIRED.

The amount of capital necessary to properly conduct a canning business may be much or little, according to the capacity of the factory and the variety of goods to be canned. There have been remarkable financial successes in this business, but equally remarkable failures also, and the latter have frequently been attributed to insufficient capital forcing the sale of the entire stock of goods when the market price is low. With sufficient capital to carry the larger part of the stock until there is a real demand for it, a fair profit will be realized and dividends may be declared. For instance, a small factory for canning tomatoes, with a capacity of 2,000 cans per day may put up 80,000 cans by operating 40 days. It will have a building and outfit of machinery and tools costing about $700. The cans will cost $1,600, the tomatoes $1,000 and the skilled and unskilled labor for forty days will cost $650, sundry items of expense $50, making in all a total of $4,000. If such a concern is capitalized at $2,000 with the expectation of making quick sales to pay for materials consumed, it may be forced to sell the entire pack at almost cost to meet its obligations and then find no profit in the investment, but with a capital of $3,000 or better, $4,000, labor may be promptly paid, the farmer will be made happy with his cash and all materials will be paid for at cash prices. The canner is then independent with his pack and can wait for a market that will pay him a profit of 10, 15 or even 20 cents per dozen cans of his tomatoes and he has realized from 20 to 30 per cent. upon his investment and owns his factory clear of debt.

Several of the largest canning establishments are capitalized with over a million dollars, and operate many factories running night and day during the busy season, each factory at its best turning out 50,000 cans per day. Such large concerns are developed only after years of experience in the management of smaller establishments. This brief bulletin is prepared to meet the queries of persons seeking their first information about the canning business, and not as a guide to the experts.

The small canning factories putting up a limited quantity of but one line of goods are better able than a large factory to give the closest attention to details and thus can insure an excellent quality in what they pack. Many of these factories contract to put up goods for large factories and thus dispose at once of the entire pack. A fair price may be secured in this way, but large profits due to real or fictitious "short supply" reports are sacrificed to the larger speculator in the goods.

The jobbers in canned goods are often responsible for extreme fluctuations in the market, and the small packer having no opportunity to know the exact condition of the supply is induced to sell on a very small margin of profit. The packer should keep himself informed concerning the true state of affairs with information from the most reliable sources, that he may protect his interests against the misrepresentations of speculators. Much canned goods is sold at first hand below cost, simply because the packer could not afford to hold his goods until an apparent glut was removed.

As an illustration of a remarkable development of a great establishment from a small beginning, we need only turn to the famous pickling and preserving house in our own State, that of H. J. Heinz Company, at Pittsburg, Pa. They write that "In 1869 the present business of H. J. Heinz Company was founded in Sharpsburg, a little suburb of Pittsburg, Pa., on three-quarters of an acre sown with horse-radish. The founder of the company was its entire force of cultivators, and two young girls were its manufacturing staff—grating the horse-radish for market. A common wheelbarrow was the only vehicle used by the company for marketing its products, and the entire manufacturing was done in a small two-story brick building. At the present day the expanded company is planting 18,000 acres with its own seeds and gathering the fruits of many thousand acres more. Its main plant at Pittsburg, Pa., occupies 17 large buildings, and it has 38 salting stations, 9 branch factories and 26 branch warehouses and offices, and employs steadily over 2,500 workers. Its original wheelbarrow has expanded into huge drays and speedy automobiles and a host of Heinz refrigerator and tank cars running throughout the United States. Inspection of this magnificent plant is invited and every courtesy is extended.

ARRANGEMENT AND PLAN OF FACTORY.

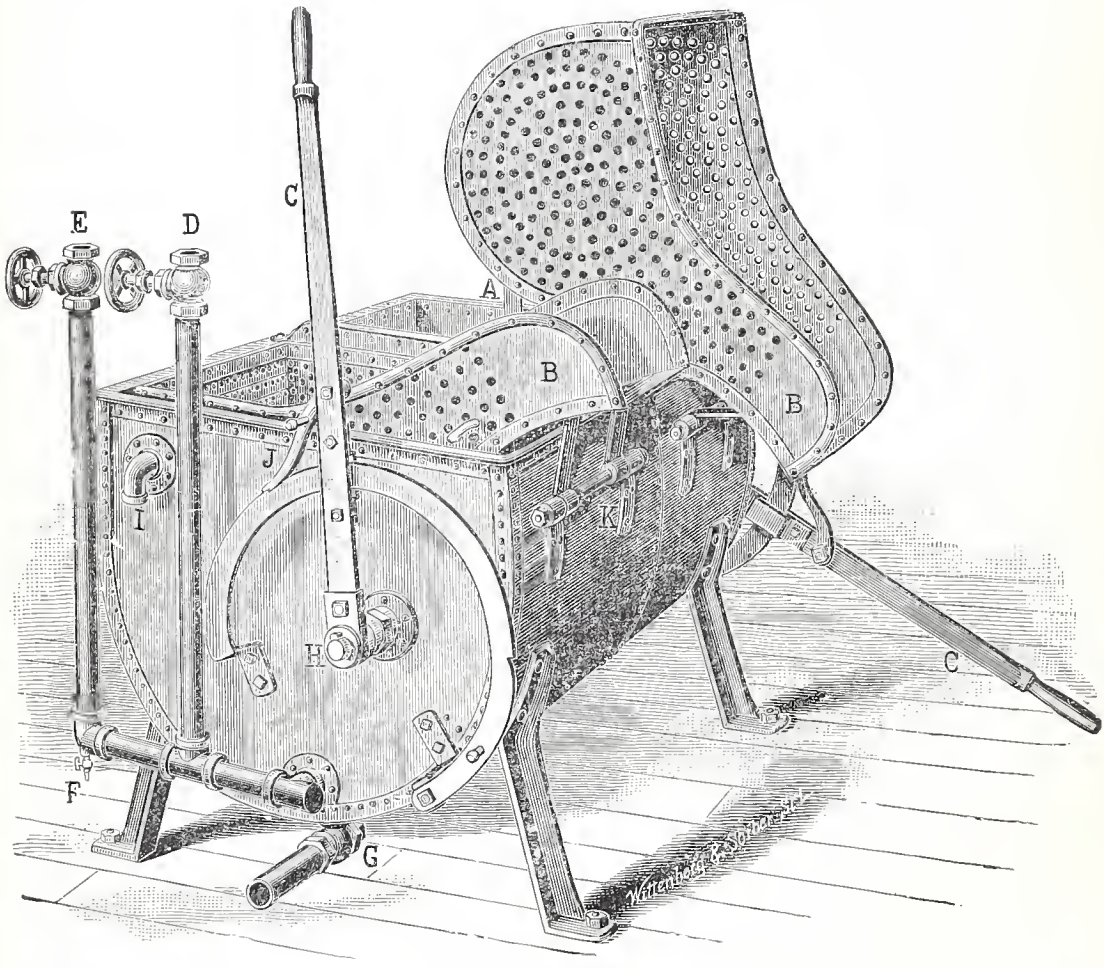
Whatever capacity of factory may be planned for, the dimensions of the building should be ample enough to permit the most convenient disposition of tables and kettles, so that there shall be no undue crowding of the workmen, and at the same time to secure such a compact arrangement that no unnecessary traveling is called for in passing from one step to another in the operations. A building 20x40 feet, two stories, will accommodate the outfit and necessary workmen for a capacity of 2,000 cans of tomatoes per day. For a capacity of 10,000 cans per day, the floor dimensions of the building should be 30x75 feet. The plan is not necessarily a rectangle. It may be more convenient to make the structure in the form of an L. For a capacity of 20,000 cans per day with the machinery for canning fruits, vegetables and meats, a building 50x100 feet would afford ample room. This, however, does not make allowance for a warehouse, which should have about an equivalent space.

The plan should permit wagons bringing raw materials to pass over scales, to make record of the weight of each delivery before reaching the receiving platform. Close to this supply is placed the scalding kettle in which the first step in canning tomatoes is taken. From here they are placed upon the peeling tables to be peeled. This is work that must be done by hand and for which women are usually employed. The peeled tomatoes are passed to the packing tables if the cans are filled by hand, or to the hopper of the filler if a machine is used. The cans are then capped upon the capping table, tested in the exhaust kettle and when effectually sealed they are submitted to the cooking process in the process kettle. After the cans are cooled, which may be hastened by passing through cold water, they are temporarily placed in cases and stored until a suitable time for labeling. It is evident, therefore, that much time and labor may be economized by so arranging the tables, kettles and other apparatus to admit the simplest handling from step to step in the series of operations.

The firms supplying canning machinery are prepared to submit designs for any style of factory to suit any set of conditions that may be proposed to them, and the cost of the structure can be estimated by a local builder.

CANNING FACTORY OUTFITS AND SPECIAL MACHINERY.

The simplest outfit for a canning factory is that used for canning tomatoes at the rate of 2,000 cans per day. For this it is customary to have a *15 H. P. boiler* to furnish steam for heating the water in the scalding kettle, the exhaust and process kettles; but a number of small factories are operated without a boiler by heating the kettles over a furnace. A *scalding kettle* is usually of cast iron with a



Double Dump Scalder.

capacity for 60 gallons. Into this the tomatoes are dipped by means of *scalding baskets* which are made of galvanized iron wire and hold a bushel. The *peeling tables* come next into use to hold the scalded tomatoes. Here about 9 women peel the tomatoes and put them into 14 quart indurated fibre buckets, of which about 2 dozen should be kept on hand. At least 2 dozen *peeling knives* are needed at this table. A *packing table* comes next into use, where the tomatoes are placed in the cans. As the cans are filled they are placed on the *capping table*, where with *capping steels* the tin caps are soldered on and the air vent is tipped with tipping coppers. On this

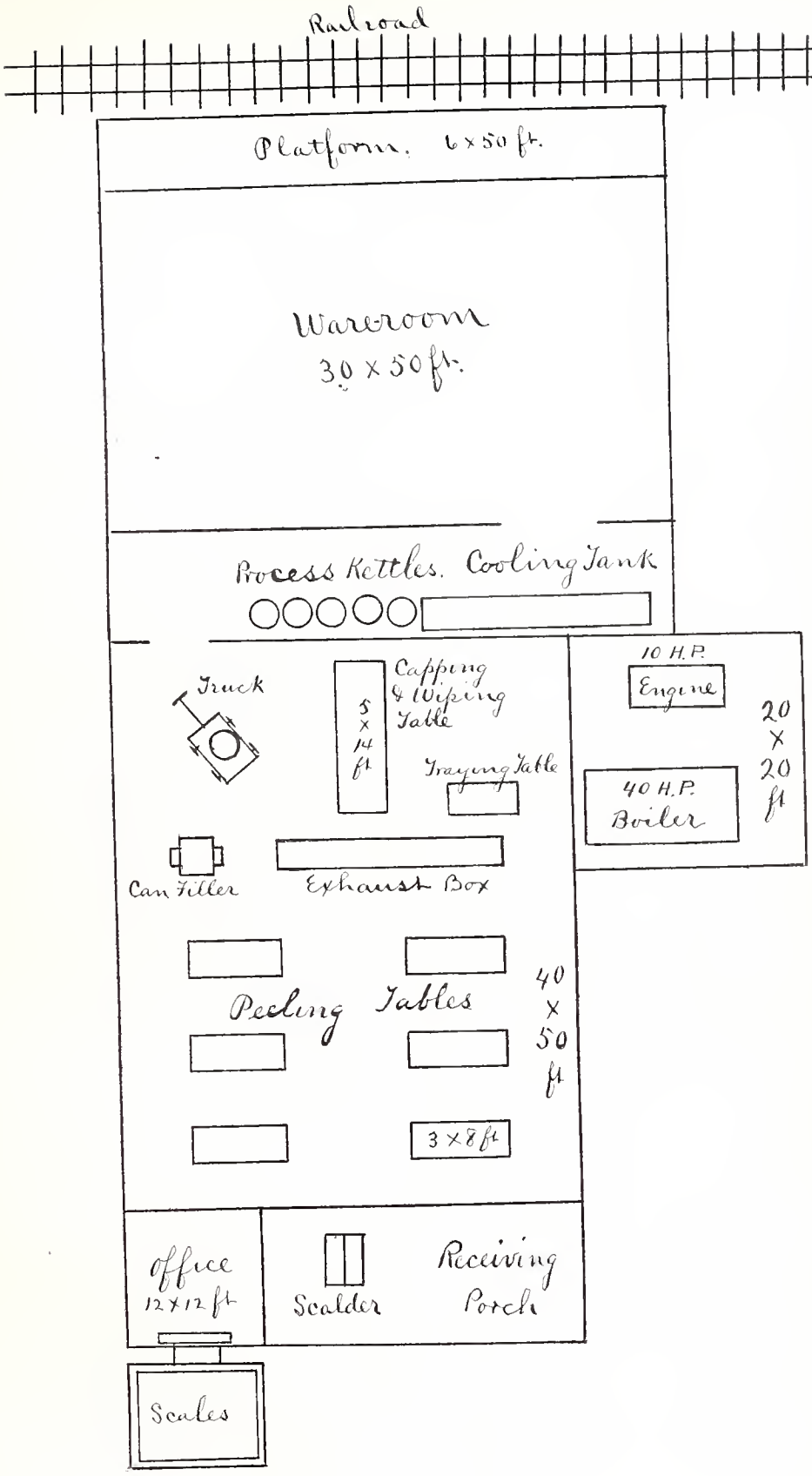

Railroad
Platform. 6 x 50 ft.
Wareroom
30 x 50 ft.
Process Kettles.
Cooling Tank
Truck
5 x 14 ft
Capping & Wiping Table
Traying Table
10 H.P.
Engine
40 H.P.
Boiler
20 x 20 ft
Can Filler
Exhaust Box
Peeling Tables
40 x 50 ft
3 x 8 ft
Office
12 x 12 ft
Scalder
Receiving Porch
Scales

table or convenient to it is placed a *gasoline fire pot* to heat the soldering tools. The next requirements is the *exhaust crate* made of strap iron in which the cans are placed in a single tier and which by means of a *crane* is lowered into the *exhaust kettle* to drive out the cold air. *Can tongs* are used to remove cans if necessary while they are hot, and lastly the process crate is used to carry two tiers of cans into the *process kettle* for the final boiling. A complete list of such an outfit is as follows:

Outfit for tomato canning plant 2,000 3 lb. cans capacity *per day*. Without boiler, kettles bricked in, heating by furnace.

1 Cast iron scalding kettle, 60 gallons.
1 Exhaust kettle, boiler iron, diameter 36 inches, depth 24 inches.
1 Process kettle, boiler iron, diameter 36 inches, depth 24 inches.
4 Scalding baskets.
2 Exhaust crates, 1 tier.
2 Process crates, 2 tiers.
3 Sets of grate bars.
3 Furnace doors.
1 Crane, complete.
1 20 gallon gasoline tank.
1 Air pump for gasoline tank.
1 Air gauge for gasoline tank.
1 Gasoline fire pot.
1 Floor truck.
4 Capping steels.
4 Tipping coppers.
1 Forging stake.
1 Vise.
1 Thermometer.
1 Platform scale.
2 Can tongs.
5 Dozen peeling knives.
1 Syrup gauge.
1 Hammer.
24 Buckets, 14 quarts.
6 Capping trays.
2 Peeling tables, 2x10 feet.
1 Packing table, $3\frac{1}{2}$x8 feet.
1 Capping table 3x8 feet.

The estimated cost of this outfit when supplied by any of the reputable houses dealing in canning machinery, is $210. If the boiler is used instead of the furnace, the cost of the outfit would exceed $450.

INCREASING CAPACITY.

If success attends the management of a small factory and the experience of a few years warrants expansion, it is not a difficult matter to introduce the modern machinery which has reached a high degree of perfection and is made to replace most of the hand labor of the small factory. In a factory with a capacity of 40,000 cans per day we find two 60 H.P. boilers to supply steam and power instead of one 15 H. P. boiler, a power scalding machine that will do the work of ten men, a platform conveyor for the peeling tables to carry the peeled fruit to the filling machine. The Lockwood Gang Tomato Filler easily fills 40,000 cans in ten hours. This outfit includes also special machinery for capping the cans and a sufficient number of process kettles to do the cooking as fast as the filled cans can be furnished. Such machinery is expensive, but when it is run at its full capacity the cost of canning is greatly reduced. When special lines of goods are to be canned in large quantities, it becomes necessary to have special machinery, as for instance, for corn there is needed one or more *corn cutting machines.* These machines cut the green corn from the cob more perfectly than can be done by hand, and receive the ears as rapidly as an operator can place them in position in the trough that feeds the knives. Such machines cost from $150 to $300 according to the style and capacity. A *corn silking machine* is used to remove the silk and bits of cob from the corn after it is cut from the cob, such machines vary in price from $50 to $200 each.

In large factories making a specialty of packing peas, is used a *pea hulling machine* which will hull from 500 to 1,000 bushels of peas in a day without bruising or crushing the peas. Other special machinery is a *pea cleaner* which is a slowly revolving screen cylinder that removes pieces of pods and other coarse particles, and a *pea separator* which is a revolving perforated cylinder that grades the peas into various sizes. A hulling machine costs about $1,500, and the separator costs about $300. The *Automatic Pea Filler and Briner* is another valuable piece of machinery in the pea factory. It may be set to fill the cans with an exact amount of peas, and a hot brine of a definite quantity is automatically poured into each can.

Another machine that greatly aids in increasing capacity in a factory is the Hawkins capping machine. There have been capping machines in use for more than ten years, but all of them entailed considerable labor and confusion. With them it was necessary to place by hand a dozen warm cans upon a tray, by hand feed the tray to the capper and by hand take away the tray after the capping and after taking out the cans return the tray for another dozen

cans. The Hawkins machine is constructed upon a totally different plan. It uses no trays, but has a continuous supply of cans. The machine takes the cans from the filler and feeds them automatically to the wiper, a series of revolving brushes, and when wiped clean they are carried by an operator who places a tin cap upon each can. In its passage each can comes in contact with an aciding device that works automatically and without any interruption is delivered to the capper which is operated by one man, the capacity being 45,000 cans in 10 hours. Twelve cans are capped by each operation of the capper. As they leave the capper by the continuous carrier another operator tips the cans in the passage. The saving of labor and expense by this machine is very great, and factories which are large enough to use it find that it greatly cheapens the cost of packing.

Outfit for a tomato canning plant, 40,000 cans capacity per day.

2 60-H. P. boiler, complete with all trimmings.
1 25-H. P. engine, complete with all trimmings.
1 100-bbl. cyprus water supply tank.
1 4-ton wagon scale.
1 Power washer and scalder.
5,000 Brass peeling checks.
32 Dozen peeling knives.
40 Dozen 14 quart buckets.
1 Platform conveyer peeling table for 150 peelers.
1 Lockwood Gang Can Filler.
1 Continuous chain steam exhauster.
1 Hawkins capping machine, complete with wiping machine, acid machine, counter shaft, inside heated tipping iron and automatic can counter.
1 Continuous can tester.
2 Fire pots.
2 Hand capping steels.
1 Dozen can tongs.
11 Open process kettles, 40x42 inches.
11 Perforated steam coils for kettles.
40 Process crates for 3 layers of cans.
1 Power crane.
1 Conveyer cooling tank.
8 Floor trucks.
1 3-bbl. gas machine with blower.
1 Combination vise.
1 Machine hammer.
1 Pipe wrench.
1 Cyclone pulp machine.

The estimated price of this excellent outfit is $5,500 and while it

is selected with reference to tomatoes, the addition of a few small pieces would complete the outfit for canning fruits and pumpkins.

A similar outfit for canning corn with a capacity of 40,000 cans per day, including the best modern machinery is estimated to cost $8,500.

THE VARIETY OF FOODS PUT UP IN CANS.

The variety of foods that is put up in cans and jars is exceedingly great and has not yet reached its limit. It is estimated that about 400 varieties of fruits, vegetables and meats are successfully packed in their season, and over 4,000 "brands" of these have been registered in the United States. The inferior qualities which in former years held canned goods under suspicion are now seldom met with; a better grade of raw materials is used and more care and cleanliness in canning is exercised. Reports of poisoning from the use of foods from tin cans are much less frequent. However, the cases of alleged poisoning by canned goods have never been reported over the signature of a reputable physician. It is a well known fact in most households that when a can is opened its contents must be removed from the tin at once or under the influence of the air an action will take place and render the food unfit for use. The neglect of this precaution, especially with tomatoes and similar acid foods, has caused cases of sickness.

PROCESSING.

The most particular work in canning foods successfully is what is known in the factory as the "process," and for which a responsible man known as the processor is an absolute necessity. He was once supposed to have locked up in him great secrets without which canning could not be properly done. His importance, however, is not diminished in the slightest degree by the disclosure of the principles of his processes, for his peculiar and "mysterious" power rests in his experience and good judgment in performing his particular work. Processing simply means the cooking of the canned goods at such a degree of temperature and for such a length of time that the contents of the can will be effectually sterilized and cooked tender. The length of time required varies with the article being canned and the temperature under which the boiling takes place. Two kinds of processing kettles are used; the *open top* and the *closed top* kettles. In the former, boiling takes place at 212° F. and no higher

temperature can be secured. This is known as the *open bath process.* The closed top kettle is an iron chest or retort into which steam may be introduced under pressure, and thus raise the temperature of the boiling water above the normal boiling point. After the filled cans are placed in this kettle, it is run full of water to the upper blow-off pipe, and the lid is then bolted securely. As steam is being introduced the upper blow-off pipe is left partially open until the water boils or the thermometer registers 212° F. The blow-off pipe is then closed tightly and the safety valve set to a temperature of 240° F. The higher the degree of heat carried the shorter is the time necessary for processing.

The following list of products and the necessary temperature with the required time in a closed-top process kettle is given by Duckwall in "Bacteriology:"

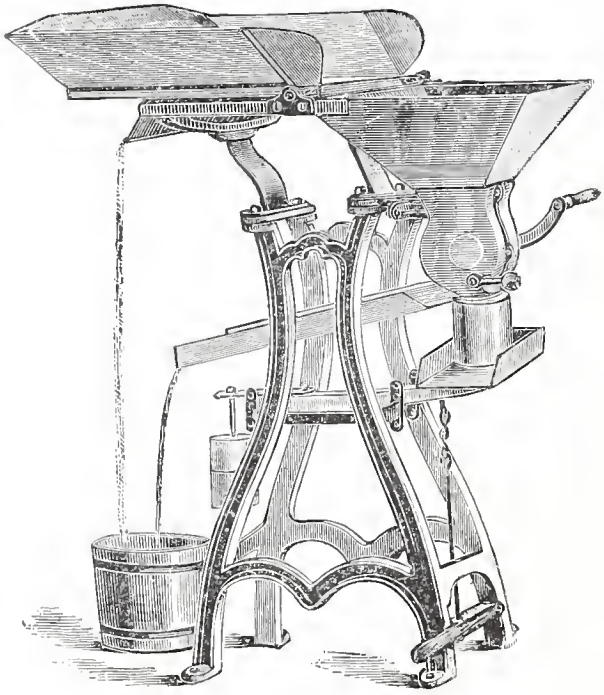
Corn, 250 degrees Fahrenheit, 55 minutes.
Young peas, 240 degrees Fahrenheit, 15 minutes.
Marrowfats, 240 degrees Fahrenheit, 25 minutes.
Milk, 250 degrees Fahrenheit, 50 minutes.
Products containing milk, 250 degrees Fahrenheit, 50 minutes.
Meats, 250 degrees Fahrenheit, 55 minutes.
Meat soups, 250 degrees Fahrenheit, 50 minutes.
Peaches, 240 degrees Fahrenheit, no time given.
Cherries, 240 degrees Fahrenheit, 2 minutes.
Plums, 240 degrees Fahrenheit, 2 minutes.
Pears, 240 degrees Fahrenheit, 12 minutes.
Tomatoes, 240 degrees Fahrenheit, 10 minutes, hot, cold pack, 15 minutes.
Apples, 240 degrees Fahrenheit, 2 minutes.
Berries, 240 degrees Fahrenheit, 2 minutes.
Lima beans, 240 degrees Fahrenheit, 25 minutes.
Pineapple, 240 degrees Fahrenheit, 8 minutes.

Some of these products like corn, peas, beans and the meats cannot be processed in open kettles, but the fruits and tomatoes may be. The time required would be from three to six times as long. Perfect sterilization means the killing of all bacteria that may have entered the can before it was hermetically sealed. These bacteria, numerous in variety, microscopical in dimensions and every where present, are the organisms which cause all the "swells" and "spoilage" of packed foods. Many of them are killed in a temperature of 212 degrees Fahrenheit, but those which work mischief in corn and animal products escape death in a boiling temperature and therefore are subjected to 250 degrees Fahrenheit to be overcome. Frequent heavy losses due to imperfect sterilization have induced some canners to use preservatives. This practice has met with just criticism and it is certain that the pure food

laws and the official inspections will drive all goods thus preserved from the markets. There is no reason for using preservatives in canned goods for it has been fully demonstrated that with the proper temperature and time in processing, canned products may be made to keep perfectly.

CANS.

Canned goods are put up in glass and tin. The former makes the better appearance, but is much more expensive and therefore can be employed only for a special grade of stock. Tin cans when properly sealed are just as serviceable to preserve the foods as is the glass. In the early days of the canning business when the cans were made entirely by hand, and 100 cans per day was the output of a single workman, they cost the packer about ten cents each. This price to-day would be enormous when we remember that the cost of the food in the can, together with the expense of putting it there is commonly but one-fifth the cost of the can.



Merrill-Soule Tomato Filler.

By the introduction of labor saving machinery within the last thirty years, the cost of cans has been greatly reduced and many factories make their own cans at about the same price they would have to pay for them to purchase from the can making establishments. These latter concerns are fully equipped and turn out several hundred thousand cans per day at one factory. Their prices of

cans are quoted below. The entire outfit for making cans of 2 lb. and 3 lbs. sizes costs about $400. This cost would be less for a factory that is equipped with heating apparatus. With such an outfit it is possible to turn out between 3,000 and 4,000 cans per day. The list of tools required includes the following:

1 Foot press.
1 Pendulum press.
1 Pair 3 pound top dies.
1 Pair 3 pound cap dies.
1 Pair 2 pound top dies.
1 Pair 2 pound cap dies.
1 Cap header.
1 Pair square shears.
1 Pair bench shears.
2 Pairs hand shears.
1 Pair forming rollers.
4 Solder frames and cylinders, 3 pounds.
4 Solder frames and cylinders, 2 pounds.
1 Fire pot for seaming.
3 Floating machines.
1 Vise.
1 Anvil.
1 Hammer.

Tin plate is put up in boxes, each box containing enough tin to make 270 3 pound cans or 370 2 pound cans. The price of tin plate fluctuates. The prices quoted for the last season were as follows:

PRICES OF TIN PLATES USED BY CANNERS.

I. C. 14x20 charcoal alloway, ...	
I. C. 14x20 102 pound Bessemer steel, ...	$6.15
I. C. 14x20 100 pound Bessemer steel, ...	6.00
I. C. 13½x19½ 95 pound Bessemer steel, ...	5.95
I. C. 13½x19½ 90 pound Bessemer steel, ...	5.90
I. C. 14x22 110 pound Bessemer steel, ...	6.75
I. C. 14x22 100 pound Bessemer steel, ...	6.50

Cans are made in certain sizes and shapes.

No. 1 is a 1 pound can 2¾ inches in diameter and 4 inches in height.

No. 2 is a 2 pound can 3 7-16 inches in diameter and 4 9-16 inches in height.

No. 3 is a 3 pound can 4 3-16 inches in diameter and 4⅝ inches in height.

"Jersey" is a 3 pound can 4¼ inches in diameter and 5 inches in height.

No. 6 is a 6 pound can, double capacity of No. 3.

No. 10 is a 1 gallon can 6½ inches in diameter and 7 inches in height.

Lunch cans are made usually in two sizes:

No. 1 lunch can has same diameter and half the height of standard No. 2.

No. 2 lunch can has same diameter and half the height of standard No. 3.

The abreviations S. H. and L. H. in quotations of cans means small hole and large hole openings at the top.

PRICES OF CANS IN 1902 FOR MARCH DELIVERY.

No. 1 cans 1½ inch opening,	$11.00 per 1,000
No. 2 cans 1½ inch opening,	15.00
No. 3 cans 2 1-16 inch opening,	20.00
Gallons 2 1-16 inch opening,	45.00
No. 1 tall 1½ inch opening,	12.00
No. 2 tall 1½ inch opening,	16.00
No. 1 lunch 1½ inch opening,	12.50
No. 2 lunch 1½ inch opening,	17.50
No. 1 oval 1½ inch opening,	13.50
No. 2 oval 1½ inch opening,	18.50
No. 3 Jersey (4¼x5 inches) 2 1-16 inches,	21.00
No. 3 Jersey (4¼x5¼ inches) 2 1-16 inches,	22.00
No. 3 Jersey (4¼x5½ inches) 2 1-16 inches,	23.00
No. 3 Jersey (4¼x5¾ inches) 2 1-16 inches,	24.00

For each increase in size opening, 50 cent per thousand additional. Less than car load lots, $1.00 per thousand additional.

These prices are subject to change at any time.

SOLDER-HEMMED CAPS.

1½ inch size,	$0.95 per 1,000
2 1-16 inch size,	1 30
2 7-16 inch size,	1.70

Factories wishing to keep their employes at work through the winter months find it advantageous to secure a can making outfit and make their supply of cans in the winter. Where this is not an object, it is customary to buy the cans which are shipped in boxes containing two dozen cans. These boxes are the cases in which the canned goods are placed upon the market.

LABELING.

Much care is exercised in the choice of labels for canned goods. The grocers shelves and window display of such goods present an attractive appearance when tastefully arranged. The colored labels aid greatly in selling such goods. The prices varies from $1.00 to $3.00 per thousand.

The labeling of cans is deferred until the rush of packing is over except for orders of prompt delivery. The labels are usually put on by hand in factories with a capacity under 10,000 cans per day. The prices paid for this work is 25 cents per 1,000 cans. In the larger factories, machines for labeling and for boxing are used.

CONTRACTS BETWEEN GROWERS AND CANNERS.

It is customary for canners to furnish the farmers, who contract to grow certain crops for them, with the seeds or even plants for such crops. These are supplied in sufficient quantities and free of cost. The purpose of this is to insure a uniform and desirable quality in the tomatoes, corn or whatever crop it may be. A written contract is always necessary to insure a sufficient tonnage to keep the factory in operation during the ripening season. It is fairer to contract to deliver the yield of a certain number of acres than a definite number of tons, for the yield is always variable, but the number of acres may be a fixed quantity. A very brief and simple form of contract generally used with the tomato growers of New Jersey is as follows:

FORM OF NEW JERSEY CONTRACT.

This is to certify that we....., have bought of ..... the product of ..... acres of tomatoes for the season of ..... at $..... per ton, delivered at our cannery .....

Stock to be in first class merchantable condition. To be planted about ..... 190 .

Signature, ...

Signature, ...

Other stipulations are sometimes inserted, limiting the time of delivery of stock, defining refusable material, and to protect the cannery in case of fire, accident or other contingency.

Following is a fuller form of contract:

TOMATO GROWERS CONTRACT.

..... Pa., ...190..

No. .....

I .... hereby agree to fur-

nish the land and everything necessary to plant and cultivate in proper manner ..... acres of land in tomatoes, all to be planted with the variety of seeds furnished by the .....Canning Co.; and I agree to deliver all the products of the above acreage to the..... Canning Co. at their factory in..... Pa., in a sound and ripe condition; I also agree to forfeit $5 per acre for any shortage in the cultivated area under the contracted figure. The..... Canning Co., agrees to pay me $25.00 per acre for all the tomatoes they fail to receive.

In consideration of the compliance with the above conditions the .....Canning Co., agrees to furnish all the seed necessary free of charge, and to pay for the tomatoes $..... per ton (of 2,000 pounds) delivered at the factory as above agreed. Settlement to be made on the.....

Tomatoes to be delivered between the hours of 7 a. m. and 6. p. m., on each working day of the week, except Saturday.

I hereby agree that in the case of the destruction of the cannery by fire, or the elements, or if for any unavoidable cause the factory is unable to receive all tomatoes grown, said factory shall have the right to limit the delivery of said acres.

..... Grower.

..... Canning Co.

THE SALE OF CANNED GOODS.

The sale of canned goods of all kinds is made principally through agencies known as canned goods brokers. Some small canners have disposed of their stock directly to the grocerymen of a neighboring city, and others, packing a single line of goods, have contracted with larger factories to deliver to them the entire pack of a season as soon as it is ready to ship. Such sales of goods are with or without labels. In the latter case the "country packer" has no brand and it is likely he will lose pride in his output. The factory receiving such goods places its own labels upon the cans and in consequence the consumers discover that certain brands are no guarantee of the quality of goods bearing them. This is one of the objectionable practices of the canning business.

As has been said the great bulk of canned goods is sold through brokers, upon written contracts between the canner and the broker. Such contracts may be made early in the season for "futures," that is for a certain number of cases of a particular brand of goods at an agreed price per case, to be delivered at a certain date. Goods sold under contract for immediate delivery are called "spots." Packers are usually required to guarantee their goods six months against

"swells." It does not matter whether the goods lies in the wholesale warehouse or in the store of the retailer, all spoilage occurring within six months from date of shipment, is redeemed by the packer. Contracts are made in triplicate, one for the packer, one for the buyer, and the third for the broker. A sample form of contract for futures is furnished by Messrs. Baker & Morgan, brokers, Aberdeen, Md.

FORM OF CONTRACT FOR FUTURES.

No. 932.

Aberdeen, Feb. 7th, 1902.

Sold to Mr. James Smith,

Cincinnati, Ohio.

For account of Mr. C. Jones.

One thousand (1,000) c-s No. 3 standard tomatoes, pack of 1902, ... brand, at .....per doz. cash less 1½ per cent. f. o. b. for prompt shipment when packed.

Six months guarantee against swells.

..... Brokers.

A form in use in Philadelphia is as follows:

No. 116 So. Front St.

Philadelphia, ...190

Sold .....

We guarantee to furnish promptly as possible well filled cans with fruit carefully selected.

Quality to equal previous season's pack or no sale.

Plain labels put on free—Wrapper labels, 2½ cents per dozen extra.

When buyer's labels are desired, notice must be given at time of purchase.

Sellers not held responsible for non-delivery if caused by destruction of factory.

In case of partial failure of the crop, sellers to be only held responsible for delivery of 60 per cent. of sale made and for any portion of remaining 40 per cent. not delivered, to pay not exceeding 10 per cent. on contract price.

TERMS—Note payable

days from date of shipment, or

Cash in 7 days.

CARTAGE—2 cents per case.

To be packed of.....

and shipped as early as possible.

Swells guaranteed to Juy 1st, following date of shipment.

Signed, ...

VEGETABLES COMMONLY CANNED.

The vegetables which take the lead in canned goods are corn, peas and tomatoes, the last named being the simplest to put up successfully. It will therefore be considered here first.

TOMATOES.

It is estimated that an area of nearly 400,000 acres of good land is devoted to the growing of tomatoes for the canning factory in this country. The large pack of 1899 reported to have exceeded 7,000,000 cases of two dozen cans, indicates the importance of the tomato in the canning industry. The bulk of the crop is grown in a few States of which Maryland is in the lead. The tomato is adapted to a great extent of territory and new regions are rapidly being devoted to the tomato and its canning.

The varieties best suited to the canner's purposes are such as produce large, smooth, solid fruits. They should be such as ripen to the stem. The "Jersey Red," so commonly seen upon labels of canned goods, is not a variety of the seedmen's catalogue, but a local name in New Jersey, for a tomato that has been grown for the cannery so long that its true name has been lost. Paragon, Champion, The Stone and Perfection are all very good varieties.

The plants are easily grown from the seed by remembering that they are very tender and should have a seed bed sheltered from cold winds and much well decayed manure worked into the soil to make it loose and warm. The plants should be ready for the field not later than the middle of June, therefore, whenever late frosts would prohibit the development of a strong plant by that time in the open ground, it is necessary to start the seedlings in a hot bed. No effort is made to have the fruit for the cannery at an early date. In this latitude the fields planted for this purpose begin to ripen in August and yield heavily until frost overtakes them. The tomato varies greatly in its yield according to the variety, the treatment, and the character of the soil. Twenty tons per acre are frequently obtained, but the average yield for a term of years on fairly good soil is eight tons, for which the farmer may expect a contract price of $5 to $7 per ton. The form of contract is very brief, simply setting forth that the

product of a given number of acres of tomatoes has been purchased by a certain cannery at a stated price per ton delivered at the factory.

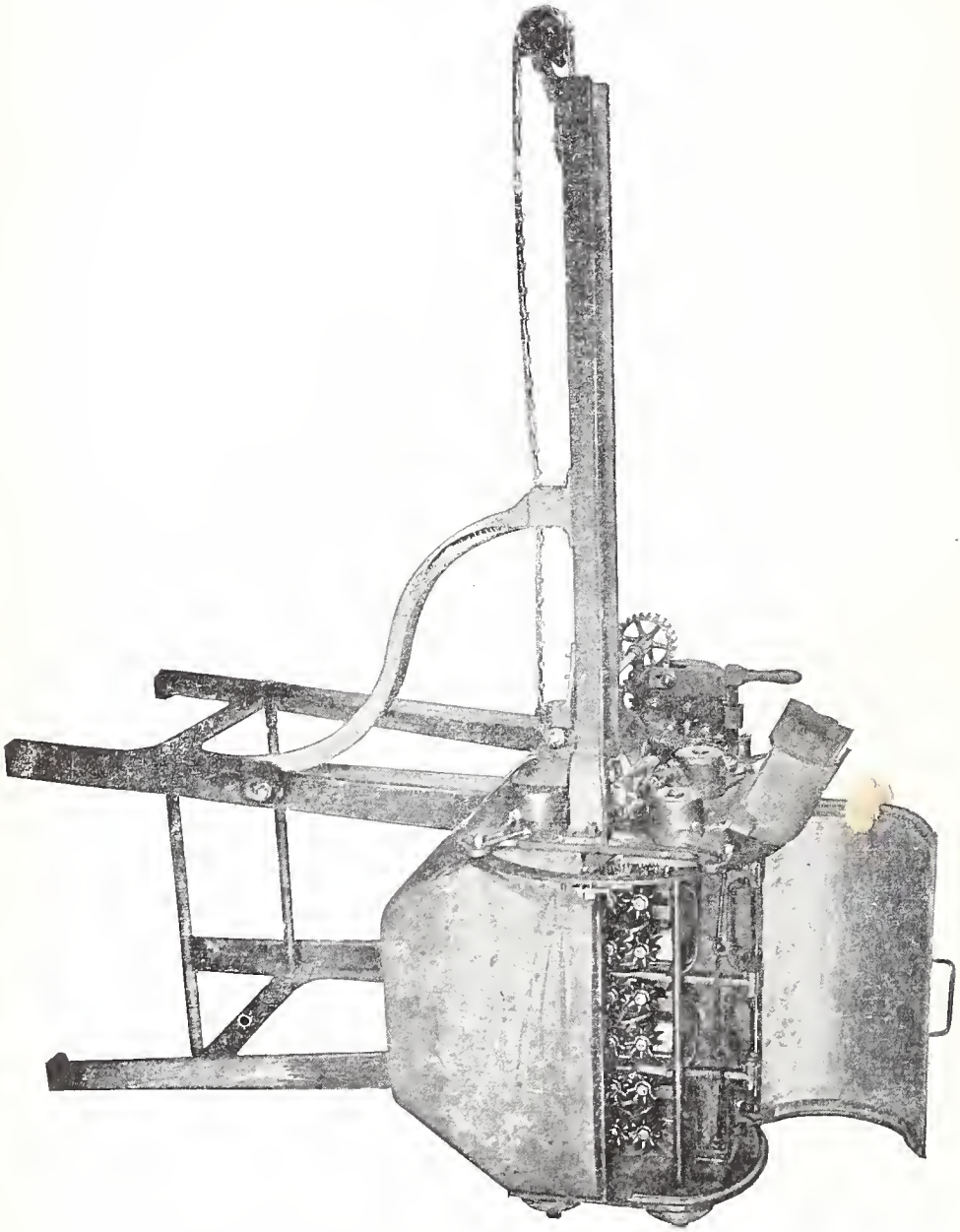
Many factories can no other product than tomatoes, and nearly every factory includes this vegetable in its list of packed goods. The tomatoes are put up in two pound and three pound cans at a cost of about 45 cents and 60 cents per dozen respectively. The practice in canning the tomato varies slightly in method. Some packers do not exhaust the cans before tipping, but cap and tip the cans as soon as they are filled and then subject them to the process. Others prefer to exhaust before the vent is tipped, and still others will steam the filled cans in steam boxes before capping them. Where the product can be rapidly passed from the scalding to the process, the first method is claimed to retain the best flavor of the tomato, but if it passes slowly from step to step the tomatoes have time to deteriorate and an inferior quality results.

The treatment of tomatoes at the factory has been given elsewhere, but is briefly outlined here again. The fruit fresh from the vines is scalded by being dipped into boiling water kept "jumping" by the injection of steam. This does not cook the tomato, but simply scalds the skin and tissue immediately under it so that the skin can be easily peeled off. This peeling is done by hand, and women are usually employed for the work. They are paid two cents per 14 quart bucketful, receiving a brass check for each bucketful as it is delivered to the packer. The checks are redeemed with cash at the office of the factory. The packer fills the cans (2 pounds or 3 pounds) as solid as possible, after which if there is to be no exhaust the cans are wiped, capped and tipped and then tested for imperfectly sealed cans by submerging about one-half inch under boiling water. This treatment promptly reveals any imperfection in the sealing of the cans by forcing out the air that rises in bubbles through the overlying water. Such cans are picked out with the can tongs and their defects are removed. The batch of cans is then processed in the open bath thirty minutes for 3 pound cans and twenty-two minutes for 2 pound cans, or in the closed bath fifteen minutes for 3 pound cans and ten minutes for 2 pound cans.

The cost of canning tomatoes like the cost of canning any other product, in fact, depends wholly upon the prices paid for raw materials and labor and the mechanical devices used. When every detail has been properly arranged the cost of packing 2 pound cans will be about forty-five cents per dozen and 3 pound cans sixty cents per dozen.

Artificial Coloring.—The market demands a very red tomato and the packer striving to meet this demand is in some sections tempted to use coloring materials. This of course is contrary to the Pure Food Laws and the conscientious packer will not transgress the law.

It is very likely that materials used to color the juice and flesh of the tomato would also color the seed, and its presence could, therefore, be easily recognized; but it is claimed by the manufacturers for the "Perfection" tomato coloring that it will not color the seeds

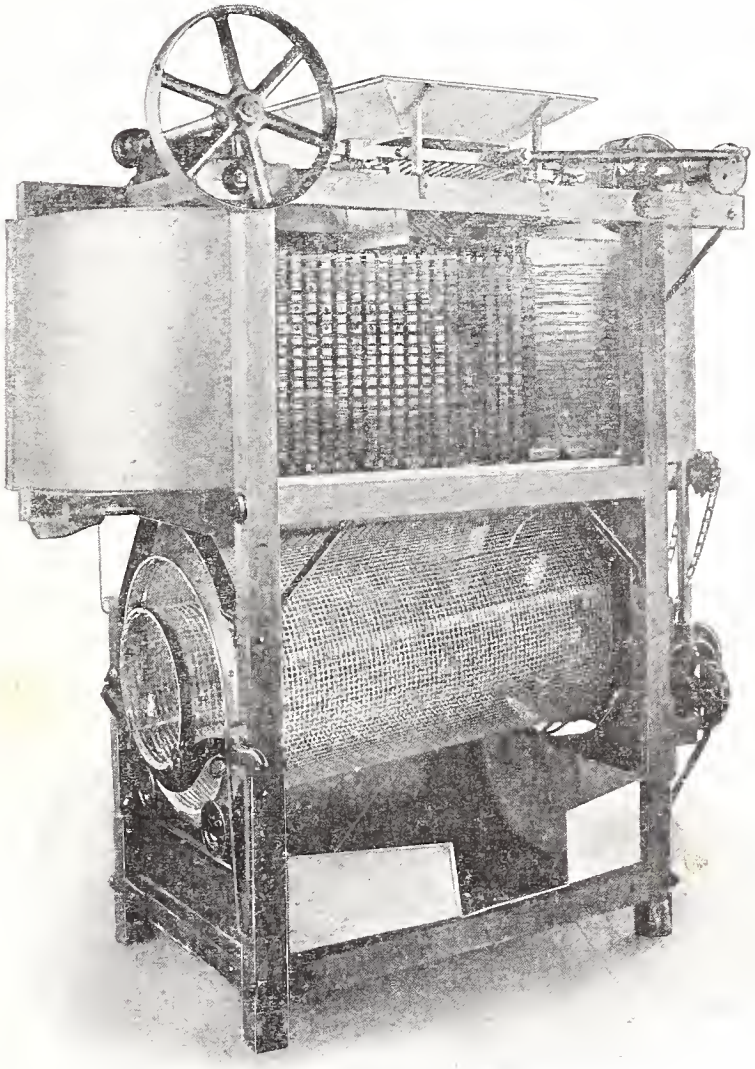


The Sprague Corn Cutter. Model M. 1900 Style C.

when used according to directions and the colored goods would pass inspection. This coloring liquid is advertised at $2.00 per gallon, a gallon being sufficient to color 25,000 3 pound cans, and is claimed to be absolutely not prejudicial to health in any quantity that might be used.

CORN.

The canning of sugar corn is about of equal importance with that of tomatoes though the profits of packing are not so easily realized in the former by the small factory. So much special machinery for putting up corn has been invented that no factory can afford to pack corn without it.



THE ULERY-MERRILL-SOULE CORN SILKER.

The varieties of corn grown for canning are the Stowell's Evergreen and Egyptian. For a fancy grade of goods the Country Gentleman is preferred. It has small grains, white color and is sweeter than the other varieties named. The canning season is lengthened by having the seed planted at various dates in the spring at intervals of

one week from May 1 to June 15. Contracts with the farmers may stipulate the date of planting to regulate the supply of the crop. Good corn land well prepared and fertilized is used for this crop. The yield of ears in the husk as delivered to the cannery is from three to five tons per acre, for which the canners pays $4.50 to $7.00 per ton. The lower prices prevail in the west and the higher prices in the east. The margin of profit to the farmer on the raw material is as small as it is to the packer on the packed goods.

The canner prefers to have the corn in a young stage, just about when it is in the best condition for table use. He directs that the ears should be pulled early in the morning and delivered promptly at the factory. To have a good white product in the can, every detail in handling the raw material must be carefully managed.

The contract with the farmer usually provides that the corn will be delivered at the factory according to the directions of the packer, that corn too young or too old may be refused, and that it must be delivered same day as it is pulled. Canners do not like to carry corn over night, hence insist upon an early delivery each day.

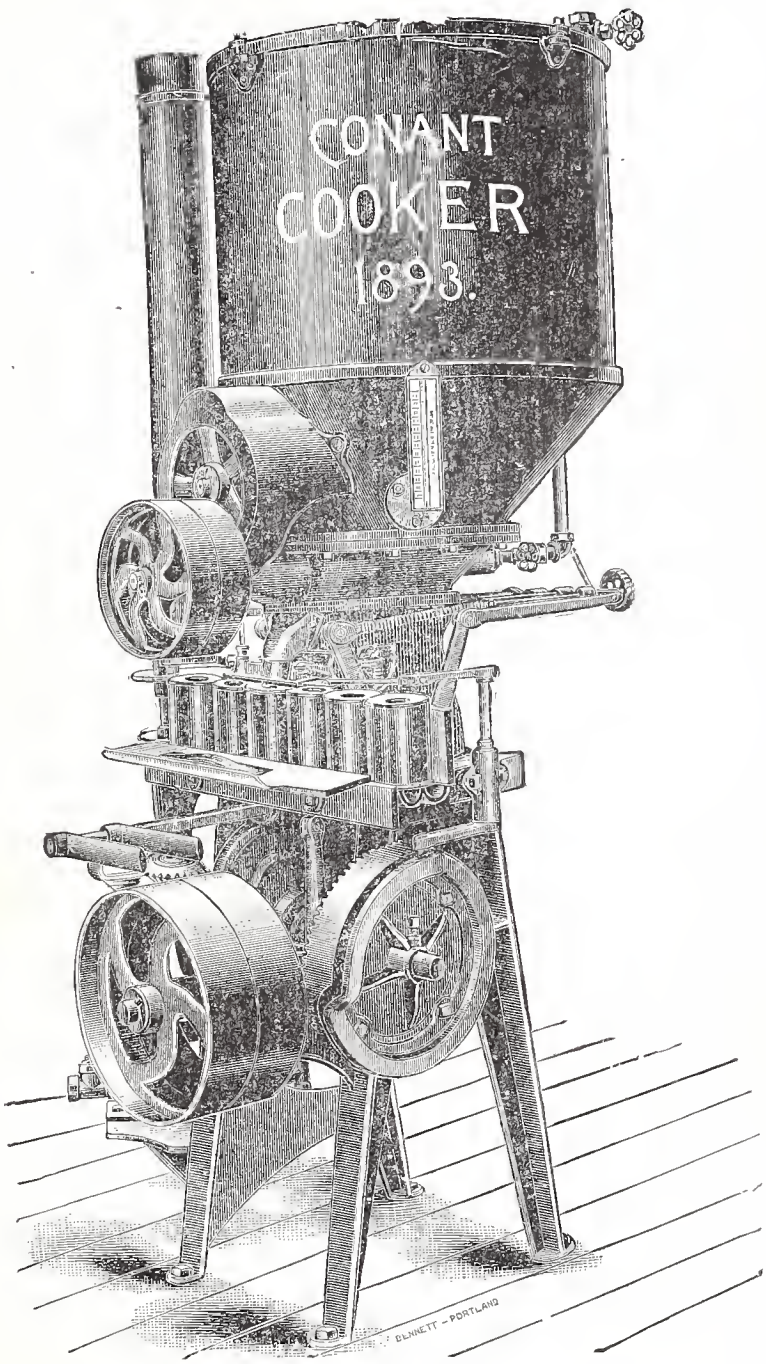
As soon as the corn arrives at the factory it is husked and the imperfect ears are trimmed of their imperfections and then passed with the good ears to the cutting machines. The Sprague corn cutter is in common use in large factories. It has a capacity of 15,000 cans per day.

Corn is cut from the cob in two different ways, by the same machinery according to the adjustment of the knives. In one case the kernels are cut off as nearly whole as possible. The corn is then passed through the silker to remove the silk and then filled cold into the cans. A weak brine is also added and the cans are then wiped and capped but not tipped. The cans are then exhausted by being immersed in boiling water for ten minutes to heat the corn and drive out the air. They are then tipped and put through the cooking process which takes place in the retorts at a temperature of 250 degrees Fahrenheit. The time of this process varies with different packers, being from forty to fifty-five minutes. After this process the cans are passed through a cold water bath to stop the cooking within, and to prevent the corn turning dark. This method is known as the moist pack or cold pack, generally practiced in Maryland.

The other method of canning corn is called the dry pack or hot pack and is commonly practiced in Maine and New York. In fact it is generally being adopted in preference to the other method in all the new corn canning sections. "Dry pack" corn commands a higher price than the "moist pack" corn.

The knives of the corn cutter are set to cut off only the upper half of the kernels while the rest is removed by the scrapers in the con-

dition of pulp. After passing the corn through a silker it is conveyed to the "corn cooker" to be heated (not to be cooked strictly speaking, for this process takes place in the retorts later), and thor-

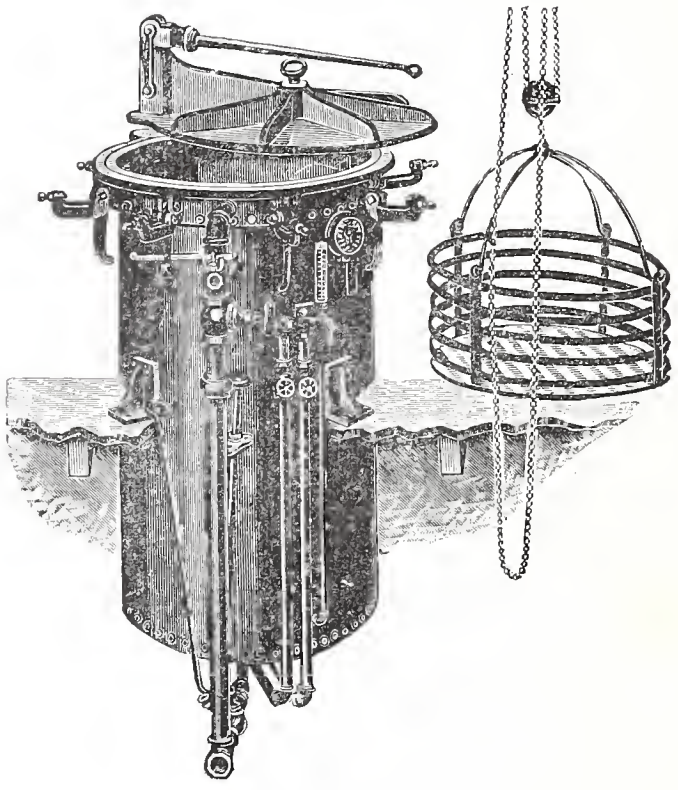


The Conant Single Corn Cooker.

oughly mixed with the brine or syrup. This cooker fills the heated corn directly into cans, and these are then promptly capped, tipped and subjected to the sterilizing process as described for the other system of packing.

Corn is regularly packed in 2 pound cans at an average cost of sixty cents per dozen.

The margin on corn is very small and severe losses are sustained by "swells" and "sour corn." The canner must make good to the merchant all the spoilage that appears in the warehouse or the grocery store. "Swells" are the cans which bulge out the lid of the can owing to a pressure from within occasioned by a fermentation of the corn. Such corn is usually "sour" and is unfit for use. It is evident that the cooking process did not effectually sterilize the contents of the can. Some bacteria resist very high temperature,



West Process Kettle.

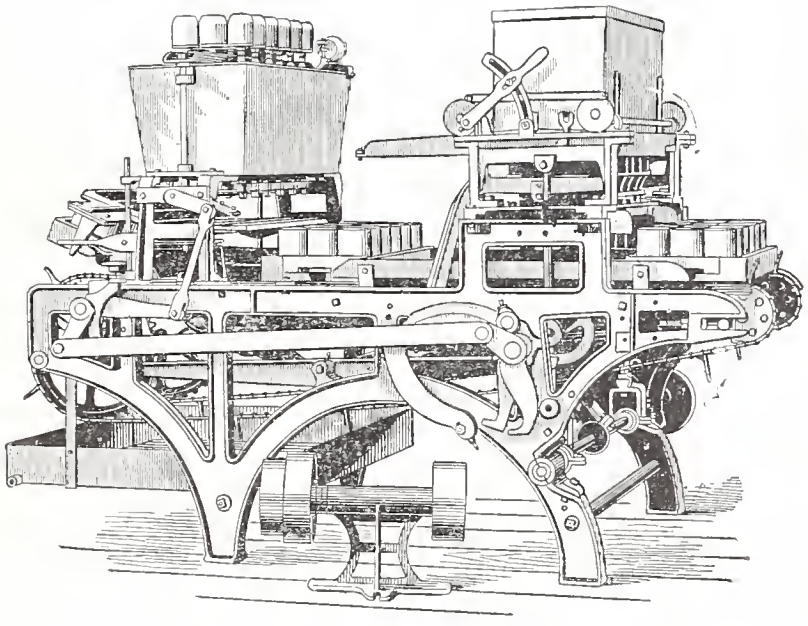
and the packer has learned by experience that the excessive cooking of high temperature turns his corn dark. Therefore the demand for whiteness and the fear of spoils keeps the packer anxiously awaiting the results of his labor.

Heat travels slowly through a mass of corn in the can and since the sterilization is often imperfect, the processor keeps himself informed of the exact temperature in the corn at the very centre of the can by using an appropriate thermometer, made expressly for the purpose. Several styles of such thermometers are in use, a very good one is the A. B. H. self-registering sterilizing thermometer, which is firmly suspended from the top of a can made expressly for the test. The bulb of the thermometer is in the exact centre of the

can. The can is filled with corn and introduced with a batch of cans in the processing retort; at the conclusion of the process the test can is removed, the thermometer taken out and the registered temperature is easily read. The test can is then emptied and cleaned for the next batch of corn to go into the retort.

PEAS.

The pea canning business has been greatly modified in recent years by the invention of some remarkable machinery, particularly the Chisholm-Scott Pea Viner. Formerly a great army of pickers was necessary in pea canning section to pick the peas from the vines in the fields. Another army of hands was necessary to hull the green



The Ballard Pea Filling and Brining Machine.

peas and so throughout the whole series of operations of canning peas the hand labor was excessive, tedious and expensive. Now the vines are cut with the scythe or mower, hauled to the factory and delivered to the viner or huller which shells and separates the peas from the vines, discharging the latter to one side and the former to the cleaner. The patentees and manufacturers of this viner are the Chisholm-Scott Co., Suspension Bridge, N. Y. They do not sell the machine, but place them with canners upon a royalty basis in restricted territories.

The varieties of peas most generally planted for canning are Alaska, Blue Beauty and French Canner. The first two varieties are known

to the canner as the "Early June" peas. They are planted as early in the spring as the weather will permit. The peas may be planted in drills to permit surface cultivation or sown broadcast. The latter method, however, is successful only with certain rich soils and the dwarf varieties of peas. The quantity of seeds required to plant an acre by the drill method is about $2\frac{1}{2}$ bushels and by the broad cast method from 3 to 4 bushels.

The vines are cut when they are yet green, before the oldest pods have begun to shrivel and delivered at the factory. The grower is entitled to the pea vines after the hulling. The pea being a leguminous plant a "nitrogen gatherer," the refuse tops are a valuable fertilizer, and if plowed under or composted with the manure heap they are worth many times over the cost of taking them home.

It has been said the peas that are taken from the vines by the remarkable machinery called the Viner, then cleaned by passing through the cleaner, then graded into four or five sizes for the cans, must show a uniform size of peas to pass as properly packed goods. The smaller sizes command the best prices. The peas are then "blanched" by scalding them in wire or perforated iron baskets. This treatment cleans and heats the peas through, after which they are delivered to a machine that fills the cans with peas and brine ready for capping. After effectually sealing the cans they are processed in the closed kettle at 240 degrees Fahrenheit for fifteen to twenty-five minutes according to the condition of the peas whether young or old. After the cans are cooled they are ready for the packing house where labeling and casing is done.

Peas are put up in 2 pound cans at a cost of about seventy cents per dozen.

BEANS, STRING.

A large quantity of string beans are canned by factories fitted up for packing peas and corn. The varieties chiefly planted are Early Valentine, Early Mohawk and Black Wax. The yield varies greatly, but for fair land with good cultivation it may be estimated at 100 bushels per acre, for which the canner will pay about thirty cents per bushel. String beans are prepared for the can much as peas are, the ends and "strings" are removed and the large pods broken in two. The product is then blanched as described for peas, packed in 2 pound cans, filled with hot brine, capped and tipped. Processing takes place in the closed kettle at a temperature of 240 degrees Fahrenheit for forty minutes.

BEANS, LIMA.

The Large White Lima and the Small White Lima are the two principal varieties of lima beans that are packed. The yield is about 75 bushels of shelled beans to the acre. The pods are shelled by hand and the beans are packed, without blanching, in 2 pound cans, dipped in a hot brine and sealed in the usual way. Lima beans are processed in the closed kettle for thirty minutes at 240 degrees Fahrenheit.

SUCCOTASH.

A combination of sweet corn and small lima beans is much called for in certain markets and will generally be found among "quotations." The proportion of each is about two parts of the former to one part of the latter. The corn is cut from the ear as for the "moist pack," that is cutting off the whole grain. The combination is then put in 2 pound cans according to the "moist pack" method for corn.

SQUASH AND PUMPKIN.

Boston Marrow and Hubbard squash, and any good cooking variety of pumpkin are canned in limited quantities, the latter for making pies.

Squash and pumpkins are first blanched, just enough to soften the rind to make peeling easy. They are then sliced and grated or mashed and packed into 3 pound cans making them full and using no liquor. The processing may be done in either the open or closed kettle, allowing forty minutes in the former and fifteen minutes in the latter.

FRUITS.

The process of fruit canning is very simple and therefore fruits are excellent material for a canner to begin on. The principles on which commercial canning is based are the same as those by which fruits have been canned for many years in kitchens. But in the handling of large quantities of perishable fruit in the manner that becomes necessary at a large canning factory, a considerable executive ability is demanded. The purchase of the fruit to be delivered in regular installments, the prompt preparation of it for the cans to avoid discoloration and deterioration, and every other operation to the conclusion of the process require some experience, wisdom and

good judgment. The canning of fruit is upon very narrow margins of profit and therefore the success of a business depends greatly upon careful management, so that every laborer will be constantly employed, every operation successfully performed and that every expense is reduced to a minimum figure. Fruit canning is most extensively carried on in California where the opportunities for getting large quantities and fine qualities of fruit cannot be excelled. For forty-five years this industry has made rapid growth in California, and the eastern canners are meeting serious competition with the high grade California canned fruits in the eastern markets.

California fruits are put up with greater care and selection than is practiced in the east. They are packed in four distinct grades. The *first grade* is of the choicest fruits, free from all defects, peeled by hand and carefully packed in cans using a strong syrup. These are known in the markets as EXTRAS, being put up in 3 pound and $2\frac{1}{2}$ pound cans. The *second grade* is known as EXTRA STANDARDS, being selected and handled with the same care as for the first grade. The fruits of the second grade are slightly smaller than in the *extras*, and are always put in $2\frac{1}{2}$ pound cans. The *third grade* is known as STANDARDS. In this the size of the fruit is smaller than in the preceding and the paring (when necessary), is done by machine. The *fourth grade* is known as SECONDS. In this an inferior grade of fruit is used. The syrup used in these four grades varies from a 10 per cent. solution in the fourth grade to a 32 per cent. solution in the extras.

All kinds of fruit may be canned successfully. Brief directions are given only for the fruits which are commonly packed in the eastern States.

APPLES.

Many small canning factories have been started in localities where apples are extensively grown, and have found it profitable to put up this one line of goods only. There are many old orchards bearing quantities of fruit that makes excellent canning material, but not being of the well known market varieties, do not command good prices when barreled. For this fruit the canner pays from 25 cents to 50 cents per bushel at the factory and the farmers are willing to sell at such prices.

Any variety that is a good cooking apple is acceptable for canning. The season may begin in August with the Red Astrachan, and this followed with Jeffries, Duchess of Oldenburg, Maiden's Blush, St. Lawrence, King, Baldwin, Bellflower, Northern Spy, Rhode Island Greening, etc.

At the factory the apples are pared and cored by suitable machines run by hand or steam power. They are then packed as solid as possible into 3 pound cans or in gallon cans, as the market demands. The cans are then filled with cold or hot water; if the former, the cans are exhausted 5 minutes at 212 degrees Fahrenheit before tipping, if the latter, they are tipped at once and submitted to the process. If this is done in the open bath the boiling is continued 10 minutes at 212 degrees Fahrenheit, if in the closed bath 2 minutes are allowed for the process at 240 degrees Fahrenheit.

PEACHES.

Peaches are successfully grown in several sections of Pennsylvania and it is remarkable that there are not more factories in these sections to work up that fruit which cannot find a better market. Peach canning is one of the important branches of the industry and a good quality of goods will find a ready sale. The best varieties are those with a firm, yellow flesh, like the Late Crawford, Elberta and Smock. The canner pays from fifty cents to $2.00 per bushel according to the season and quality of the fruit. At the factory the fruit is pared, cut into halves, removing the stones. The pieces of peach are then carefully packed into the cans and the ten degree cane sugar syrup is poured over them to fill the cans. They are then capped, exhausted five minutes at 212 degrees Fahrenheit, tipped and processed ten minutes at 212 degrees Fahrenheit in open bath or two minutes at 240 degrees Fahrenheit in closed bath.

It costs from $1.50 to $2.50 per case to put up such peaches, and they sell in the market at usually double the cost.

"Pie Fruit" is an inferior grade of peach not pared but cut into pieces and put up in the cans with water instead of a syrup. They cost less to pack and are of course sold at a lower figure than the other grades of peaches.

PEARS.

Pears in cans are always in good demand. The supply of the fruit is limited. The Bartlett stands at the head of the list of varieties, although it is not necessary to refuse any variety at the canning factory. The best price is paid for Bartletts ranging from forty cents to $1.25 per bushel. Pears are put up in 2 pound cans in the east and in 3 pound cans in California. The fruit is pared, cut into halves or quarters, removing the core and bruises and put up in a cold cane-

sugar syrup using a ten per cent. or even heavier solution. The cans are exhausted at 212 degrees Fahrenheit for five minutes then processed twelve minutes in the open bath or twelve minutes in the closed bath at 240 degrees Fahrenheit. The cost of putting up such pears ranges from $1.00 to $2.00 per case.

Other fruits that are canned with profit by the factories located within reach of the products are cherries, plums, quinces, apricots, blackberries, currants, gooseberries, grapes, pineapples, raspberries, strawberries and huckleberries.

APRICOTS AND NECTARINES.

Apricots and nectarines are canned chiefly in California. These fruits are wiped but not pared (except for special grades of goods), cut into halves and packed into cans with a cane sugar syrup.

BERRIES.

Blackberries, currants, gooseberries, grapes and whortleberries are all packed to a limited extent. The method of canning is the same in all cases. When the fruit is cleaned it is packed in 2 pound cans with cold or hot water, sealed and processed as for apples.

Raspberries and strawberries are prepared for the cans as for other berries, but are packed with a syrup using extra heavy syrups for the strawberries. The processing is about the same as for other berries.

CHERRIES AND PLUMS.

The best cherries and plums in cans come from California, though some cherries are packed in the east. These fruits are put up with a syrup and the white or yellow-fruited varieties are preferred.

Other fruits are packed but the principal ones of the east have been considered. The pineapple is very largely canned in Baltimore, using the fruits which are shipped north from Florida and other southern countries.

Jellies. Canners of fruits often find it convenient to convert some of their fruit into jellies, but too often the fruit reaches them too ripe to make good jelly. The fruit should be at its first stage of ripeness, carefully cleaned and cleared of decayed spots. It is then run through a grinding machine and put into a kettle with just enough water to keep the fruit from burning or scorching. It is boiled slowly for a half hour to extract the juices and then placed in jelly

sacks to drain the liquid from the pulp (ordinary sugar sacks washed clean are excellent for this purpose.) The juice is further cleared by passing through one or more layers of cotton wool. When it has been thus treated, the juice is again heated very slowly. To every gallon of juice is added four and one-half pounds of granulated sugar, and boiling is continued for twenty minutes more. The jelly glasses are then filled full and left to cool, then a teaspoonful of boiling hot paraffine wax is dropped over the jelly in each glass, and a tin cover over the glass completes the work.

Crystalized Fruit. This style of preserving fruit is peculiar to the California packers. Candied, crystalized or glace fruits are now found among all first class confections, and were first prepared about 25 years ago. The processes are evolved from much experimentation and are not made public. This much may be said of the general method of making candied fruit. The juice of the fruit is extracted and replaced with a sugar syrup which upon hardening prevents decay and at the same time retains the natural shape of the fruit. All kinds of fruits may thus be preserved. The best fruits are selected when at the proper degree of ripeness for ordinary canning. The large fruits are pared and halved, and plums and cherries are pitted. The fruit thus prepared is placed in baskets or perforated buckets and suspended in boiling water. This removes the juice from the fruit and demands the greatest skill to be properly timed. After the fruit is cooled it is placed in earthen pans and covered with a very heavy syrup, ordinarily one testing 70 degrees by a Balling saccharometer. In this syrup, made with white granulated cane sugar, the fruit is allowed to remain for one week, then there is danger of a fermentation setting in which must be checked by heating to boiling point the fruit and syrup. This heating is repeated at intervals as necessary for about six weeks. The fruit is then taken out of the syrup, washed in clean water and is then glaced or crystalized as preferred. It is glaced by dipping into a thick sugar syrup and being left to harden quickly in the air. By dipping thus and causing it to cool and harden slowly, the sugar on the surface crystalizes and makes the crystalized fruit.

THE STANDARD OF THE BALTIMORE CANNED GOODS EXCHANGE.

Officers of the Exchange.

Wm. Miller, President. A. F. Jones, Secretary.

Apples.—Pared and cored, clear in color; cans to be full of fruit, put up in water.

Blackberries.—Cans to cut out not less than two-thirds full after draining; fruit to be sound, put up in water.

Cherries.—White Wax. Cans to be full of fruit, free of specks and decay, put up in not less than ten degrees of cold cane sugar syrup.

Cherries.—Red. Cans full of fruit, free of specks or decay, put up in water.

Gooseberries.—Cans to cut out not less than two-thirds full after draining; fruit unripe and uncapped; put up in water.

Egg Plums and Green Gages.—Cans full, whole fruit, free from reddish color or specks, put up in not less than ten degrees of cold cane sugar syrup.

Peaches.—Cans full, fruit good size, evenly pared, cut in half pieces, put up in not less than ten degrees of cold cane sugar syrup.

Pie Peaches.—Cans full, fruit sound, unpared, cut in half pieces, put up in water.

Pears.—Bartlett. Cans full, fruit white and clear, pared, cut in half or quarter pieces, put up in not less than ten degrees of cold cane sugar syrup.

Pears.—Bell or Duchess. Cans full, fruit pared, cut in half or quarter pieces, put up in not less than ten degrees of cold cane sugar syrup.

Pineapples.—Cans full, fruit sound and carefully pared, slices laid in evenly, put up in not less than ten degrees of cold cane sugar syrup.

Plums and Damsons.—Cans full, sound fruit, put up in water.

Quinces.—Cans full, fruit pared and cored, cut in half or quarter pieces, put up in not less than ten degrees of cold cane sugar syrup.

Raspberries.—Cans to cut out not less than two-thirds full and after draining, fruit to be sound, put up in not less than ten degrees of cold cane sugar syrup.

Strawberries.—Cans to cut out after draining not less than half full of fruit, which shall be sound, and not of the variety known as seedlings, put up in not less than ten degrees of cold cane sugar syrup.

Whortleberries.—Cans full, fruit to be sound, put up in water.

VEGETABLES.

Lima Beans.—Cans full of green beans, clear liquor.

String Beans.—Cans full, beans young and tender and carefully strung, packed during growing season.

Corn.—Sweet corn only to be used from the cob while young and tender, cans to cut out full of corn.

Peas.—Cans full of young and tender peas, free of yellow or black eyes, clear liquor.

Pumpkin.—To be solid packed as possible, free from lumps and of good color.

Succotash.—Cans to be full of green corn and green lima beans.

Tomatoes.—Cans to be reasonably solid, of good, ripe fruit, cold packed.

Oysters.—To cut out not less than five ounces for No. 1, and ten ounces for No. 2 cans; of dry meat, after liquor is drained off. To be good size and bright color.

STANDARD SIZES FOR CANS.

Adopted by the Baltimore Canned Goods Exchange, November 19, 1393.

	Diameter.	Height.
No. 1 Cans	$2\frac{3}{4}$ in.	4 in.
No. 2 Cans	3 7-16 in.	4 9-16 in.
No. 3 Cans	4 3-16 in.	$4\frac{7}{8}$ in.
No. 6 Cans, twice the quantity of No. 3.		
No. 10 Cans	$6\frac{1}{4}$ in.	7 in.

STANDARD SIZES FOR BOXES.

Sizes of Boxes for Canned Goods—Inside Measurement.

2 dozen Cans, size 1,	$11\frac{1}{2}$x $8\frac{1}{2}$x $8\frac{1}{4}$ inches.
2 " " " 3,	$14\frac{1}{2}$x$10\frac{1}{2}$x $9\frac{1}{2}$ "
2 " " " 3,	$17\frac{1}{4}$x13 x$10\frac{1}{4}$ "
4 " " " 1,	$16\frac{1}{2}$x$11\frac{1}{4}$x $8\frac{1}{4}$ "
1 " " " 1, flat,	$11\frac{1}{2}$x $8\frac{1}{2}$x $4\frac{1}{4}$ "
1 " " " 2, "	$14\frac{1}{4}$x$10\frac{1}{2}$x $4\frac{3}{4}$ "
$\frac{1}{2}$ " Gallon Cans,	19 x$12\frac{3}{4}$x $7\frac{1}{4}$ "
1 " " " high boxes,	19 x$12\frac{3}{4}$x14 "
1 " " " flat "	$25\frac{1}{2}$x19 x 7 "
1 " No. 6 Cans,	$20\frac{3}{8}$x$15\frac{3}{8}$x $6\frac{7}{8}$ "

SHIPPING WEIGHTS FOR CANNED GOODS.

No. 1 Boxes, ...26 pounds.
No. 2 Boxes, ...46 "
No. 3 Boxes, ...70 "

PUBLICATIONS CONCERNING THE CANNING OF VEGETABLES AND FRUITS.

The Art of Canning and Preserving as an Industry. By Dr. Jean Pacrette, of Paris. New York, 1901. Price $10.00.

The Secrets of Canning. By Ernest Schwaab. New York, 1899. Price $5.00

Bacteriology. By E. W. Duckwall. Baltimore, 1899. Price $5.00. A study of the bacteria of canned foods.

Fruit Growers Manual, for Canning Fruits, etc. By Hemlon-Meriam Co. California. Price $2.50.

Tomato Growing (for the Cannery), Farmer's Bulletin No. 76. U. S. Dept of Agr. By Edw. B. Voorhees, M. A. Director of New Jersey Agricultural Experiment Station. 1898.

Pea Canning in Delaware. Bulletin XLI. Delaware Agricultural Experiment Station, Newark, Del. By G. Harold Powell, Horticulturist of Station. 1898.

These publications have been freely consulted in the preparation of this bulletin and while making acknowledgements to the authors, the writer also remembers the canners who extended courtesies at their factories and the canning machinery manufacturers for the valuable suggestion they have made. Special thanks are due the Sprague Canning Machinery Co., and the Ayars Machine Co., for the use of illustrations of modern special machinery.

SUPPLY HOUSES AND MANUFACTURERS OF CANNING FACTORY MACHINERY AND MATERIALS.

The American Can Co., Bowling Green Building, New York city, N. Y.; Merchant's Bank Building, Baltimore, Md.; Merchant's Loan and Trust Building, Chicago, Ill.; 209-221 Mission street, San Francisco, Cal.

The Sinclair-Scott Co., Wells and Patapsco streets, Baltimore, Md.

Cox Bros. & Co., Bridgeton, N. J.

Stevenson & Co., 229 N. Holliday street, Baltimore, Md.

Ayars Machine Co., Salem, N. J.

Consumers Can Co., Baltimore, Md.

The Fred H. Knapp Co., 42 River street, Chicago, Ill., labelling machine.

The Grasselli Chemical Co., Cleveland Ohio, soldering flux.

Thomsen Chemical Co., Baltimore, Md., soldering flux.

A. B. Robins & Co., 724 E. Pratt street, Baltimore, Md., outfits.

H. Cottingham, Baltimore, Md., outfits.

The Sprague Canning Machinery Co., Chicago, Ill., outfits.

Burt Labelling Machine Co., 404 Atlantic Trust Building, Baltimore, Md.

Remington Machine Co., Wilmington, Del.

The Monumental Label Co., Baltimore, Md.

Hastings Industrial Co., 79 Dearborn street, Chicago, Ill., outfitters.

E. J. Lewis, Middleport, N. Y., machinery.

John E. Smith's Sons, Buffalo, N. Y., kraut cutters.

Stayman & Co., 125 East Falls avenue, Baltimore, Md., can making outfits.

Thomson Manufacturing Co., 33 S. Gay street, Baltimore, Md., machinery and cans.

A. Schultz & Co., 1016 East Baltimore street, Baltimore, Md., solders and fluxes.

J. S. Hull Manufacturing Co., 125 127 East Falls avenue, Baltimore, Md., gasoline apparatus.

Moore & McFerren, Hoopestown, Ill., cottonwood boxes.

The Union Can Co., Hoopestown, Ill., tin cans; Buffalo, N. Y., tin cans.

Adriance Machine Works, 252 Van Brunt St., Brooklyn, N. Y., can making machinery.

CANNED GOODS BROKERS.

Baker & Morgan, Aberdeen, Md.

N. H. Dudley & Co., cor. Duane and Hudson streets, New York city.

Walter G. Holcombe, 303 California street, San Francisco, Cal.

M. Morfit, Baltimore, Md.

T. J. Meehan & Co., 407 Water street, Baltimore, Md.

H. H. Taylor & Sons, Baltimore, Md.

J. L. Rowland & Co., Baltimore, Md.

Wm. H. Nichols & Co., 42 River street, Chicago, Ill.

Watson M. Null, 241 S. Front street, Philadelphia, Pa.

Wm. G. Bonstedt & Co., 10 S. Front street, Philadelphia, Pa.
Wm. J. Young, 53 S. Front street, Philadelphia, Pa.
Thos. Roberts & Co., 116 S. Front street, Philadelphia, Pa.
Wilson Sherborne & Co., 107 N. Water street, Philadelphia, Pa.
Wm. Castle, 18 N. Water street, Philadelphia, Pa.

CANNING FACTORIES OF FRUITS AND VEGETABLES IN THE UNITED STATES.

California:

Campbell, J. C. Amsley Packing Co.
San Francisco, Hickmot Asparagus Canning Co.
San José, J. H. Flickinger & Co.

Colorado:

Denver, The Küner Pickle Co.
Longmont, The Empson Packing Co.

Delaware:

Bridgeville, H. P. Cannon.
Camden, Stetson & Ellison.
Harrington, Fleming & Co.
Laurel, Geo. W. Stradley.
Milford, David Reis.
Rising Sun, Farmer's Preserving Co.
Seaford, Greenabaum Bros.
Seaford, Ross Bros.
Smyrna, John H. Hoffnicker.
Woodside, S. H. Derby & Co.

Illinois:

Bloomington, Bloomington Canning Co.
Elgin, Elgin Packing Co.
Eureka, Dickinson & Co.
Hoopestown, Illinois Canning Co.

Indiana:

Cayuga, N. S. Martz.
Eaton, Indiana Packing Co.
Greenwood, J. T. Polk.
Muncie, Crampton-Tohey Canning Co.

Indiana—Continued.

Muncie, Magic Packing Co.
New Castle, Blue River Canning Co.
Sellersburg, Silver Creek Canning Co.

Iowa:

Fort Madison, Fort Madison Canning Co.
Waverly, The Kelly Canning Co.

Maine:

Brunswick, Baxter Bros. Co.
Farmington, C. S. Dingley & Co.
Jonesport, Jonesport Packing Co.
Lubec, Eureka Packing Co.
North Lubec, Lubec Packing Co.
Portland, Portland Packing Co.
Portland, The Twitchell-Chaplin Co.

Maryland:

Baltimore, W. W. Boyer & Co.
Baltimore, The John Boyle Co.
Baltimore, Gibbs Preserving Co.
Baltimore, W. Grech & Co.
Baltimore, S. M. Lawder & Sons Co.
Baltimore, H. J. McGrath & Co.
Baltimore, Thos. J. Meyer & Co.
Baltimore, Wm. Numsen & Sons.
Baltimore, The Sterling Packing Co.
Baltimore, The Martin Wagner Co.
Baltimore, Moore & Brady.
Bethlehem, R. M. Messick.
Buckeystown, The Buckeystown Packing Co.
Cambridge, Ivey L. Leonard Packing Co.
Easton, Hubbard & Bro.
Frederick, Monocacy Canning Co.
Goldsboro, Robt. Jarrell.
Greensboro, F. P. Roe & Bro.
Havre de Grace, H. A. Osborn.
Hillsboro, Stewart & Jarrell.
Perryman, John W. Bay & Co.
Ridge Summit, Emmond Bros.
Union Mills, B. F. Shriver & Co.
Westminster, B. F. Shriver & Co.
Westminster, Smith Yingling & Co.

Michigan:

Adrian, Adrian Packing Co.
Benton Harbor, Alden Canning Co.
Kalamazoo, The Dunkle Celery and Preserving Co.
Dowagiac, Dowagiac Canning Co.

New Jersey:

Bridgeton, B. S. Ayars.
Freehold, Jos. Brakeley.
Greenwich, Watson Bros & Co.
Salem, Hiles & Hilliard.
Salem, Stam & Bro.
Salem, Mrs. J. W. Lippencott.
Sharpstown, Kerrison M. Davies.
Stevens, Frederick Cooper.

New York:

Buffalo, Erie Preserving Co.
Buffalo, The United States Canning Co.
Clyde, Dwight Hemmingway.
East Rush, Genesee Valley Preserving Co.
Fairport, Howard Thomas Co.
Fredonia, Fredonia Canning and Manufacturing Co.
Geneva, Geneva Preserving Co.
Geneva, Torrey Park Preserving Co.
New York City, Romain & Co.
Rochester, Curtice Brothers.
Rome, Clinton Canning Co.
Rome, Fort Stanwix Canning Co.
Syracuse, H. C. Hemmingway & Co.
Taberg, A. V. Lane.
Verona, Empire State Canning Co.
Verona, Fred Merry.
Westernville, Mohawk Valley Canning Co.
Williamstown, J. J. & F. White.

Ohio:

Ashville, Sciota Canning Co.
Beach City, The Trescott Packing Co.
Canton, Canton Canning Co.
Circleville, C. E. Sears & Co.
Cleveland, Cleveland Canning Co.
Dayton, North Dayton Packing Co.

Ohio—Continued.

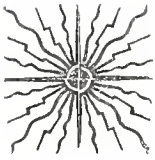
Pleasant Hill, Pleasant Hill Canning Co.
West Alexandria, Gem Canning Co.

Pennsylvania:

Delta, J. S. Whiteford.
Girard, Hamilton Bros.
Hanover, Winnebrenner & Co.
Littlestown, B. F. Shriver & Co.
McCall's Ferry, E. W. Urey & Co.
North East, The North East Preserving Co.
Philadelphia, Wm. F. Beck.
Philadelphia, Pennsylvania Packing and Provision Co.
Philadelphia, Selser Bros. Co.
Pleasant Grove, E. M. Haines.
Shamokin, Shamokin Packing Co.
Stewartstown, J. B. Gable.
Stewartstown, J. M. Jordan.
York, York Packing Co.
York, John H. Thomas.

Wisconsin:

Manitowoc, A. Landreth Co.
Manitowoc, East Wisconsin Canning Co.
Sun Prairie, Sun Prairie Canning Co.
Two Rivers, E. J. Vodra Canning Co.



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